Status of case

Claims 1 through 12 are pending.

Claim Rejections under 35 U.S.C. § 101

Claims 6 and 12 were rejected under 35 U.S.C. §101 as being directed to non-statutory subject matter. Applicants amend claims 6 and 12 where it is believed appropriate.

Claim Rejections under 35 USC §§ 102, 103

Claims 1, 2, 6-8, and 12 were rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 6,272,177 (Murakami). Claims 3, 5, 9 and 11 were rejected under 35 U.S.C. 103(a) as being unpatentable over Murakami in view of U.S. Patent Application No. 2002/0146072 (Sun).

The claims as currently presented recite determining complexity information between a coding target frame and a reference frame. See claims 1, 6, 7, and 12 ("complexity extraction means for extracting complexity information which indicates a degree of complexity of movement between said coding target frame and said reference frame for each of the plurality of blocks"); claim 2 ("complexity extraction means extracts complexity information which indicates a degree of complexity of movement from the reference frame for each of the plurality of blocks"); claim 8 ("complexity extraction means extracts complexity information which indicates a degree of complexity of movement between said coding target frame and said reference frame for each of the plurality of blocks"). The claims further recite using the complexity information to determine the number of filtering pixels. See claims 1, 6, 7, and 12 ("predicted image generating means for determining the number of filtering pixels depending on said complexity information for each of the plurality of blocks on basis of a predetermined rule, wherein said filtering pixel is said interpolated pixel which have pixel values produced by applying the low-pass filter having the narrower spectral band-pass in low frequency band of said two low-pass filters to neighborhood integer pixels"); claim 2 ("predicted image generating means determines the number of filtering pixels depending on said complexity information for each of the plurality of blocks on basis of a predetermined rule, wherein said filtering pixel is said interpolated pixel which have pixel values produced by applying the low-pass filter having the narrower spectral band-pass in low frequency band of two low-pass filters with different high-frequency cutoff characteristics which preliminarily stored to neighbor integer pixels");and

claim 8 ("predicted image generating means determines the number of filtering pixels depending on said complexity information for each of the plurality of blocks on basis of a predetermined rule, wherein said filtering pixel is said interpolated pixel which have pixel values produced by applying the low-pass filter having the narrower spectral band-pass in low frequency band of two low-pass filters with different high-frequency cutoff characteristics which preliminarily stored to neighborhood integer pixels").

According to one aspect of the invention, in blocks in which variation from the reference frame is small, the predicted image is generated using the high resolution prediction reference image having a reduced number of filtering pixels. In this way, the precision of the motion compensation prediction is improved, and accordingly, redundancy is reduced. On the other hand, in blocks in which variation from the reference frame is large, the predicted image is generated by using an increased number of filtering pixels. Accordingly, the difference between the predicted image and the processing target block is reduced. As a result, redundancy is reduced. Thus, by flexibly varying the number of filtering pixels in accordance with the variation from the reference frame for each block of the coding target frame, the encoding efficiency may be improved. See, e.g., paragraph [0010] of the present application.

In contrast, the cited references fail to teach or suggest either alone or in combination using complexity information to determine the number of filtering pixels. For example, the Murakami reference teaches the following:

> The decision unit 31 generates the filter control signal 23 specifying filtering intensity according to a normalized result. Specifically, when a normalized value is larger, indicating that the image signal contains a great amount of higher frequency components, the image signal is filtered with higher filtering intensity. When a normalized value is smaller, on the other hand, indicating that the signal contains a large amount of lower frequency components, the image signal is filtered with lower filtering intensity.

Col. 10, lines 25-33. The Office Action states that the above excerpt teaches that the number of filtering pixels is increased based on the complexity information. Applicants respectfully disagree. The Murakami reference teaches a difference signal 32 is the difference between the input image signal 12 and the motion compensation predictive signal 14. Col. 9, lines 13-16. The "difference signal 32 is normalized or divided by the "Activity" of the image signal in the decision unit 31. A normalized result or value decides filtering intensity for eliminating higher frequency components in the Image signal." Col. 10, lines 21-25. Thus, the normalized difference signal determines which frequencies to filter, not how much to filter. For example, the Murakami reference teaches that when the "normalized value is larger, indicating that the

image signal contains a great amount of higher frequency components, the image signal is filtered with higher filtering intensity." This means that when the normalized value is larger, higher frequencies are at issue, requiring filtering of higher frequencies (not that there is more filtering). Similarly, the Murakami reference teaches that when the "a normalized value is smaller, on the other hand, indicating that the signal contains a large amount of lower frequency components, the image signal is filtered with lower filtering intensity." This means that when the normalized value is lower, lower frequencies are at issue, requiring filtering of lower frequencies (not that there is less filtering). This interpretation of the filtering is supported by the Murakami reference, which teaches that the adaptive filer 22 (which performs the "higher filtering intensity" and "lower filtering intensity") includes filters for different frequencies:

> The adaptive filter 22 filters the motion compensation predictive signal 14 according to the filter control signal 23 for eliminating higher frequency components in the signal. As shown in FIG. 9, the adaptive filter 22 can provide a multi-dimensional filtering including one-, two- and three-dimensional filters. The three-dimensional filter can change the filtering coefficient based upon the motion in an image signal as the frame varies with time. Filtering intensity of the adaptive filter can be varied according to the filtering coefficient specified by the filter control signal 23.

Thus, the adaptive filter 22 does not teach how much to filter based on the filter control signal 23, instead teaching what frequencies to filter (such as "eliminating higher frequency components in the signal"). Therefore, the Murakami reference fails to teach or suggest the claims as currently presented.

Likewise, the Sun reference fails to teach or suggest using complexity information to determine the number of filtering pixels. The Sun reference merely teaches that "[c]oding parameters for the adjacent blocks are identified" and "filtering between the identified adjacent blocks is skipped if the coding parameters for the identified adjacent blocks are similar and not skipped if the coding parameters for the identified adjacent blocks are substantially different." Abstract. The Sun reference thus fails to teach or suggest the invention as claimed. Therefore, the claims as currently presented are patentable over the art of record.

SUMMARY

Applicant respectfully requests early allowance of this application. The Examiner is invited to contact the undersigned attorneys for the Applicant via telephone if such communication would expedite this application.

Respectfully submitted,

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